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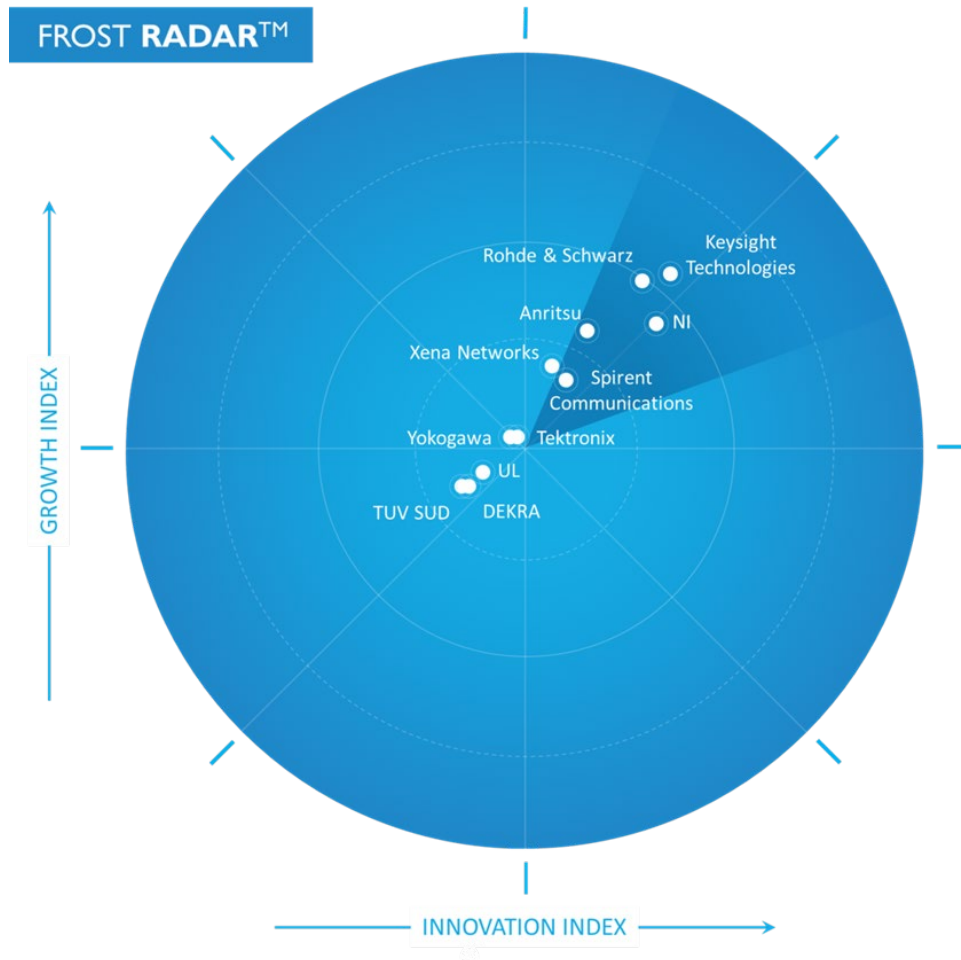
BEST PRACTICES

AWARDS

FROST & SULLIVAN

2020 BEST PRACTICES AWARD

2020 GLOBAL AUTONOMOUS CAR AND ELECTRIC VEHICLE TESTING INNOVATION EXCELLENCE FROST RADAR AWARD

The Frost Radar[TM]

The Autonomous Car and Electric Vehicle Testing Market

In a field of more than 100 global industry participants, Frost & Sullivan has independently ranked the top 11 companies in the above Frost Radar™ analysis. The key parameters independently analyzed by Frost & Sullivan include:

- Innovation Scalability
- R&D
- Product Portfolio
- Mega Trends Leverage
- Customer Alignment
- Growth Pipeline
- Vision and Strategy
- Sales and Marketing
- Revenue Growth
- Market Share Growth

Frost & Sullivan studies related to this independent analysis:

- *Autonomous Car and Electric Vehicle Growth Opportunities in the Test and Measurement Market, Forecast to 2025*

The Growth Environment

Autonomous cars and electric vehicles testing cover a broad range of solutions and services. These are used to validate the advanced driver-assistant systems (ADAS); connected car technologies; infotainment and telematics such as navigation systems and wireless technologies and components of the electric powertrain; the battery; ultra-charging technologies; and the invertor, which are important elements of the electric vehicle.

ADAS consist of multiple components; thus, it is not economical to test every individual component that forms the ADAS. Instead, original equipment manufacturers (OEMs)use testing methodologies, such as hardware-in-the-loop, to simulate real-world traffic scenarios in a lab environment to test the drivability of the vehicle. Hardware-in-the-loop (HIL) testing also has a wide degree of applications in testing components of the electric powertrain. Another important trend is the replacement of multi-bus technologies such as control area network (CAN), local interconnect network (LIN), and FlexRay with automotive Ethernet. This addresses interoperability issues and also enhances bandwidth required for higher volume of data from a number of ECUs and DCUs on the vehicle.

National Instruments is a global leader in PXI-based test instrumentation and data acquisition (DAQ) systems. National Instruments' modular hardware-in-the-loop (HIL) systems are used by most global automotive OEMs for the research & development of ADAS technologies and electric powertrain technologies that are used in electric vehicles. National Instruments' flexible platform approach is ideal for flexible testing that is required for developing a fully autonomous, self-driving vehicle.

Frost Radar™ Innovation Excellence Award

NI

Growth

- From 2017 until 2019, NI grew by a compound annual growth rate of 3.0%.
  The strong growth rate was mostly driven through investments into high growth avenues like autonomous cars and EVs.

- In the autonomous car and EV market, however, NI is expected to move slightly higher on the Growth index due to its innovative product portfolio and growth pipeline. As a result, NI should retain its market share of 10-12% in the foreseeable future.

- NI's partnership with other companies, such as ETAS and OptimalPlus, reaffirms its commitment to help automotive OEMs shorten test time and reduce time-to-market.

Innovation

- NI plays a key role in testing vehicles at different product stages, such as design, validation, prototyping, and manufacturing.

- Its software-defined platform is used extensively to test autonomous car technologies such as ADAS, sensor fusion, and new EV powertrain technologies.

- With solutions such as PXI, LabVIEW, TestStand, and VeriStand, NI is a pioneer in the development of HIL and VIL testing methodologies.

- NI's integrated test systems such as the ECU Test System and the Battery Test System increase flexibility and integrate new technologies; thereby, reducing the development time of autonomous and EVs

- At 20.1%, NI's expenditure on R&D is significantly higher than the industrial average. Therefore, the company is placed higher than its competitors on the Innovation index.

Next Steps

- With the development of autonomous vehicles, cybersecurity is a key focus.
  NI should collaborate with cybersecurity specialists to address threats that can compromise the integrity of the
  self-driving car.
- The quality of network coverage is an external factor impacting the degree of connectivity a self-driving car has.
  NI should, therefore, enhance its partnerships with vendors offering network optimizing solutions to better monitor and address coverage quality.

What is the Frost Radar™?
Companies to Action – Benchmarking Future Growth Potential

What is it?

The Frost Radar™ is a robust analytical tool that benchmarks companies' innovation focus and growth performance in a given market.

How is it built?

Through in-depth analysis built on Frost & Sullivan's 360-degree research methodology (primary and secondary research) and objective rating of companies in a given market.

Why do you need it?

To understand how companies benchmark against each other in their ability to innovate and grow against a backdrop of industry transformation.

What will it accomplish?

Companies can gain an objective, independent perspective of their innovation and growth strategies, including their robustness, effectiveness, relative competitive strength, and implications for their long-term success.

How to use it?

The Frost Radar™ is a dynamic tracking tool that offers frequent rating and positioning of companies that are leading the industry in growth, innovation, or both. Because of changes in the operating environment and internal organizational changes, their positioning in the Frost Radar™ will change over time. It is important to leverage the Frost Radar™ to ensure that companies are aware of changes to their ecosystem and their relative positions to it.

What does it mean to be on the Frost Radar™?

Companies have been chosen to be in the Frost Radar™ because they have proven themselves to be worthy by demonstrating excellence in growth, innovation, or both, and are able to translate that into proven solutions that benefit their clients. At times, companies with high market share may not place on the Radar. Companies are chosen because they are already doing great things or are poised to do great things.

> All companies on the Frost Radar™ could be Companies to Action. Best Practice recipients are the companies that Frost & Sullivan considers the **Companies to Act On Now**.

Growth Excellence Award

The Growth Excellence best practice award is bestowed upon companies that are achieving high growth in an intensely competitive industry. This includes emerging companies making great strides in market penetration and seasoned incumbents holding on to their perch at the pinnacle of the industry.

Innovation Excellence Award

The Innovation Excellence best practice award is bestowed upon companies that are industry leaders outperforming their competitors in this area, or new market entrants contending for leadership through heavy investment in R&D and innovation.

Growth, Innovation & Leadership Award

The Growth Innovation Leadership (GIL) best practice award is bestowed on companies that are market leaders at the forefront of innovation. These companies consolidate or grow their leadership position by continuously innovating and creating new products and solutions that serve the evolving needs of the customer base. These companies are also best positioned to expand the market by strategically broadening their product portfolio.

Frost Radar™ – Benchmarking Future Growth Potential
2 Major Indices, 10 Analytical Ingredients, 1 Platform

Vertical Axis – The Growth Index

Growth index is a measure of a company's growth performance and track record, along with its ability to develop and execute a fully aligned growth strategy and vision; a robust growth pipeline system; and effective market, competitor, and end-user focused sales and marketing strategies. The elements of this index include:

- **GI1: Market Share (previous 3 years):** This is a comparison of a company's market share relative to its competitors in a given market space for the previous 3 years.
- **GI2: Revenue Growth (previous 3 years):** This is a look at a company's revenue growth rate for the previous 3 years in the market/ industry/category that forms the context for the given Frost Radar.
- **GI3: Growth Pipeline:** This is an evaluation of the strength and leverage of a company's growth pipeline system to continuously capture, analyze and prioritize its universe of growth opportunities.
- **GI4: Vision and Strategy:** This is an assessment of how well a company's growth strategy is aligned with its vision. Are the investments the company is making in new products and markets consistent with the stated vision?
- **GI5: Sales and Marketing:** This is a measure of the effectiveness of a company's sales and marketing efforts in helping it drive demand and achieve its growth objectives.

Horizontal Axis – The Innovation Index

Innovation index is a measure of a company's ability to innovate products/services/solutions (with a clear understanding of disruptive Mega Trends) that are globally applicable, are able to evolve and expand to serve multiple markets, and are aligned to customers' changing needs. The elements of this index include:

- **II1: Innovation Scalability:** This determines whether an organization's innovations are globally scalable and applicable in both developing and mature markets, and also in adjacent and non-adjacent industry verticals.

- **II2: Research and Development:** This is a measure of the efficacy of a company's R&D strategy, as determined by the size of its R&D investment and how it feeds the innovation pipeline.
- **II3: Product Portfolio:** This is a measure of a company's product portfolio, focusing on the relative contribution of new products to its annual revenue.
- **II4: Mega Trends Leverage:** This is an assessment of a company's proactive leverage of evolving, long-term opportunities and new business models, as the foundation of its innovation pipeline.
- **II5: Customer Alignment:** This evaluates the applicability of a company's products/ services/ solutions to current and potential customers, as well as how its innovation strategy is influenced by evolving customer needs.